

THREE NEW SPECIES OF *PHOLCUS* (ARANEAE, PHOLCIDAE) FROM THE CANARY ISLANDS WITH NOTES ON THE GENUS *PHOLCUS* IN THE ARCHIPELAGO

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ABSTRACT. Over the last decade, numerous papers focusing on the fauna of the Canary Islands have reported that many spectacular species radiations have taken place, leading to a very high level of endemism in this archipelago. The species of the genus *Pholcus* are a very good example of such a fascinating process. The Canary Islands harbor the highest number of endemic species of this genus. Therefore, in order to obtain a detailed picture of the diversity and the phylogeny of the Canarian *Pholcus*, a complete taxonomic revision is required. The present work is the second contribution to achieve this goal. Three new species of *Pholcus* are described: *Pholcus bimbache*, *P. anachoreta* and *P. corniger*. The first endemic species of *Pholcus* from El Hierro (*P. bimbache*) is reported; *P. anachoreta* is the only *Pholcus* species found on the Montaña Clara Islet; and *P. corniger* is the second and most troglomorphic species known from Tenerife.

Keywords: Araneae, Pholcidae, *Pholcus* new species, taxonomy, Canary Islands

The Canary Islands are situated about 100 km off the northwestern coast of Africa. This volcanic archipelago was formed during various volcanic episodes and is nowadays composed of seven main islands and several islets. All of them are situated almost on a straight line with an east-west orientation, with the age of the islands decreasing towards the east. The estimated ages of the islands are: Fuerteventura 20–22 My, Lanzarote 15–19 My, Gran Canaria 14–16 My, Tenerife 11.6–14 My, La Gomera 10–12 My, La Palma 1.6–2 My and El Hierro 0.8–1 My (Anguita & Hernán 1975; Ancochea et al. 1990; Coello et al. 1992).

The older islands, Fuerteventura and Lanzarote, are lower in elevation due to the effects of erosion. As a result of their low height they receive less moisture from the northeast trade winds than the other, higher islands. This, and the proximity of the Sahara Desert, renders them the driest islands in the archipelago, with most of their habitats being dry lowlands. The remainder of the Canary Islands have higher mountains, reaching an elevation of 3717 m (Teide, Tenerife). This high

elevation combined with the trade winds (humid from the northeast and dry from the northwest), causes a thermic inversion that forms a cloud belt between 600 and 1000 m. These clouds are almost permanent on the northern slopes, favoring the growth of a characteristic subtropical forest named laurel forest.

Differences in humidity and elevation between and within islands are the main reasons for the development of a large variety of habitats. The so-called hypogean environment also contributes to changes in the diversity of habitats. In the case of the Canaries it is formed by lava tubes and the MSS (mesocavernous shallow stratum) (Oromí et al. 1986; Medina 1991). This high diversity of ecological niches and the initial emptiness of habitats provide the best conditions for species radiations.

The spider genus *Pholcus* Walckenaer 1805 is a good example of this process. The 114 species that it comprises are distributed almost all around the world. However, it is interesting to note that there are no indigenous *Pholcus* species in Central and South America and only a few are known from North America.

Before the present study, eighteen species of *Pholcus* had been reported from the Canary

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Islands. This represents more than 15% of the total number of species of this genus. If we add to them the five species from Madeira (another Macaronesian island), this ratio reaches more than 19%. At the same time, the area of these islands represents an extremely small part of the total area of the generic distribution, providing clear evidence of a species radiation on the Canary Islands.

Apart from the cosmopolitan *P. phalangoides* (Fuesslin 1775), the remaining species of *Pholcus* recorded from the Canary Islands are endemic to this archipelago. Two of them have been collected from more than one island: *P. ornatus* Böesenberg 1895 has the broadest distribution, occurring on all the islands except Lanzarote and Fuerteventura; and *P. fuerteventurensis* Wunderlich 1991 is found on Fuerteventura and Gran Canaria. *Pholcus knoeseli* Wunderlich 1991, *P. malpaisensis* Wunderlich 1991, *P. mascaensis* Wunderlich 1987, *P. baldiosensis* Wunderlich 1991, *P. roquensis* Wunderlich 1991, *P. intricatus* Dimitrov & Ribera 2003 and *P. tenerifensis* Wunderlich 1987 are endemic to the island of Tenerife. *Pholcus multidentatus* Wunderlich 1987, *P. calcar* Wunderlich 1987, *P. corcho* Wunderlich 1987, *P. edentatus* Campos & Wunderlich 1995 and *P. helenae* Wunderlich 1987 are known only from the island of Gran Canaria, while *P. gomerae* Wunderlich 1980, *P. gomeroides* Wunderlich 1987 and *P. sveni* Wunderlich 1987 are endemic to La Gomera.

In the present work, three new endemic species of *Pholcus* are described. *Pholcus bimbache* is the first endemic *Phoclus* species from El Hierro; *P. anachoreta* is endemic to the Montaña Clara islet and *P. corniger* is the second and most troglomorphic species of this genus known from this archipelago. With these three new species the number of Canarian endemic species of *Pholcus* reaches twenty, eighteen of which are mono-insular endemics, indicating that the genus has a higher diversity in the Canary Islands than previously suspected.

Pholcus corniger is the most troglomorphic species of *Pholcus* known from the Canaries. While in *P. baldiosensis*, the other troglomorphic species, the reduction of the eyes is incomplete, in *P. corniger* they are totally absent. This species, unfortunately, may be extinct due to the destruction of its habitat in Cueva de San Miguel, where residual waters

are thrown out of houses nearby. This seems to be still a common practice in the Canaries, affecting numerous volcanic tubes and small caves. Estimating how many species suffer from this particular activity and how many are brought to extinction will be a difficult task. Taking into account the high vulnerability of both cave faunas and island ecosystems, Canarian authorities and the Spanish government should implement more active and efficient measures to eliminate these type of activities.

METHODS

Specimens were examined under a Wild Heerbrugg (12–100X) stereomicroscope. The female vulva was removed and treated with 50% solution of lactic acid in order to render the remaining soft tissues transparent. After observation and drawing the vulva were washed in distilled water and stored in 70% ethyl alcohol. All measurements are in millimeters. The total body length is the sum of the prosoma and the opisthosoma omitting the pedicel. The specimens are deposited in the Departament de Biologia Animal, Universitat de Barcelona (CCRUB). The numbers of the collection are given in brackets.

TAXONOMY

Family Pholcidae C.L. Koch 1851

Genus *Pholcus* Walckenaer 1805

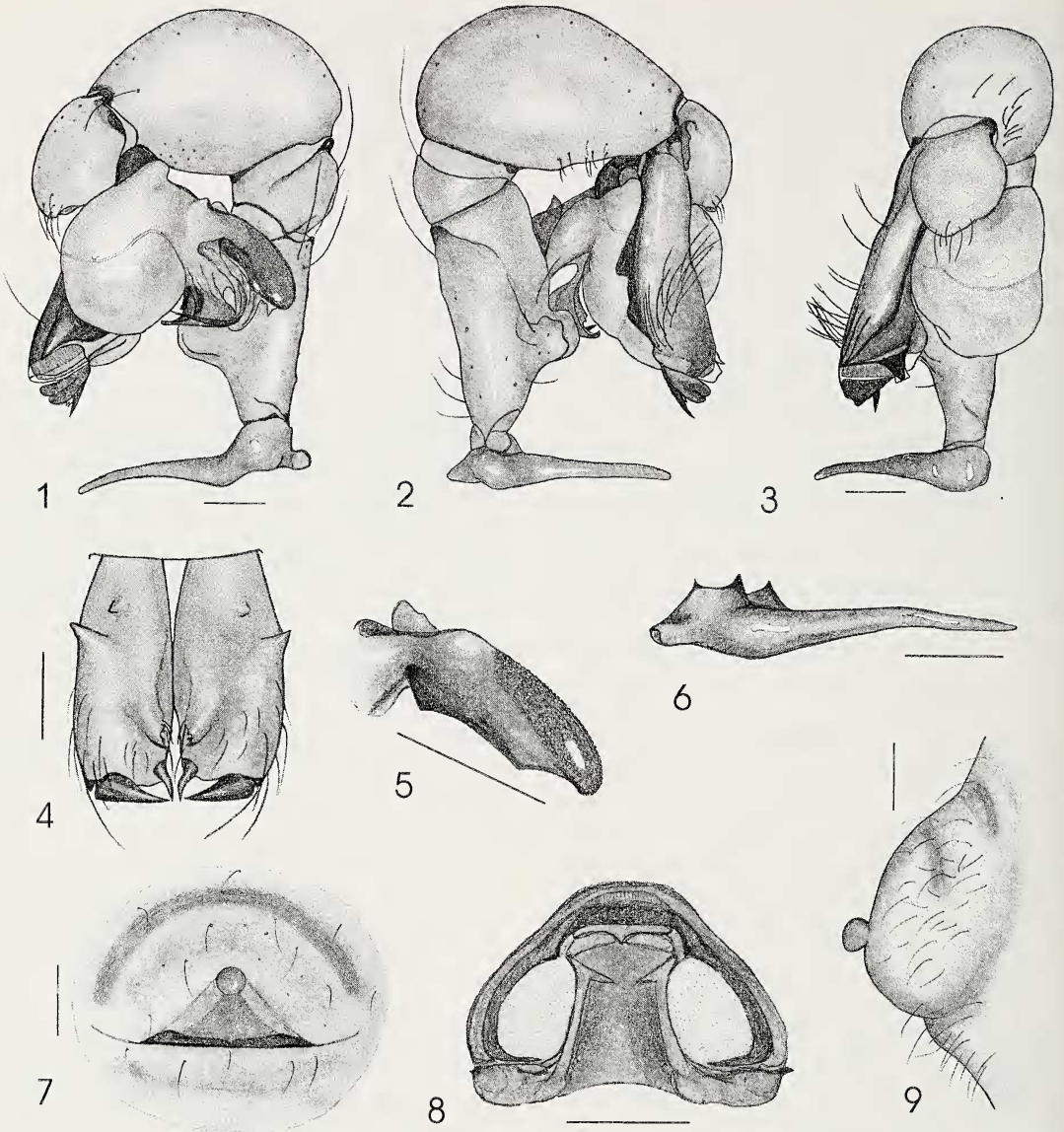
Pholcus bimbache new species

Figs. 1–9

Material examined.—Holotype male, Cueva del Juaclo de las Moleras, Frontera, El Hierro, Canary Islands, 27°43'N, 18°08'W, 7 November 1991, C. Ribera (CCRUB 3523–140). Paratypes: Canary Islands: 1 female, same locality and date as holotype, C. Ribera (CCRUB 3524–140) (drawings and description of the female are based on this specimen); 1 male, 2 females and 8 juveniles (CCRUB 3522, 3525 to 3527–140) same locality and date as holotype; 1 male and 1 juvenile, same locality, 4 February 2000, N. Mercader & E. Muñoz (CCRUB 4505–170).

Etymology.—The species is named after the original inhabitants of El Hierro island, the so-called “Bimbaches”.

Diagnosis.—*Pholcus bimbache* can be distinguished from similar Canarian species (*P. sveni* and *P. gomerae*) by the less pronounced callosity of the procurus, the narrower base



Figures 1-9.—*Pholcus bimbache* new species: 1. Male palp, prolateral view; 2. Male palp, retrolateral view; 3. Male palp, frontal view; 4. Male chelicerae; 5. Uncus; 6. Trochanter of the male palp; 7. Epigynum, ventral view; 8. Vulva, dorsal view; 9. Epigynum, lateral view. Scale 0.2 mm.

of the uncus (Fig. 5), the longer claw-shaped apophysis of the appendix and the long, almost straight trochanteral apophysis (Fig. 6) of the male palp (Figs. 1-3); also, by the shape of the apophyses of the male chelicerae (Fig. 4). The diagnostic characters of the female are the shape of the epigynum and the large oval pore plates of the vulva (Figs. 7-9).

Description.—*Male (holotype)*: Prosoma yellowish with well marked cephalothoracic

junction and fovea. Ocular area elevated. Thorax with brown marking, wider than long, which starts at the fovea and extends to the posterior margin of the prosoma. It has three lighter zones dividing it into four darker radial lobes. Sternum brown-yellowish with borders slightly darker brown. Distance between AME equal to their diameter. Distance AME-ALE slightly more than two times the diameter of AME; AME-PME three times the diameter of AME. Anterior eye line frontal view slightly

recurved. Posterior eye line dorsal view recurved. Clypeus high with yellowish color. Chelicerae (Fig. 4) yellow-brownish; cheliceral apophyses brownish with cylindrical shape finishing with small darker outgrowths; upper margin of the proximolateral apophyses does not reach the lower margin of the frontal prominence. A few dark bristles are placed near the base of the cheliceral apophyses. Palps (Figs. 1–3) with yellow-brownish color; trochanter with long retrolateral apophysis (Fig. 6), femur large with ventral bulge, procurus with dark process of the apical apophysis. Opisthosoma elongated, almost cylindrical, whitish with small darker transversal zone in the genital area.

Female (paratype): All characters as in male except: less elevated ocular area, distance between AME slightly less than their diameter, distance AME-ALE slightly less than two times the diameter of the AME, AME-PME two and half times the diameter of the AME. Chelicerae without apophyses. Genital zone without pigmentation except the sclerotized zone of the epigynum. By transparency some parts of the vulva can be observed. Epigynum and vulva as in (Figs. 7–9).

Measurements.—*Male (holotype)*: Prosoma 1.2 (1.2) wide, 1.3 (1.3) long; opisthosoma 1.1 (1.5) wide and 2.5 (3.0) long. Total body length 3.8 (4.3). Legs: I, femur 8.7(9.2), patella 0.5(0.5), tibia 8.1(9.5), metatarsus 13.2(14.3), tarsus 2.0(2.2), total 32.5(37.5); II 6.5(7.0), 0.5(0.5), 6.0(6.5), 9.0(8.5), 1.3(1.5), 23.3(24.0); III 5.0(5.0), 0.5(0.5), 4.0(4.2), 6.2(7.0), 1.0(1.0), 16.7(17.7); IV 6.3(7.0), 0.5(0.5), 5.8(6.2), 8.0(9.0), 1.2(1.1) 21.8(23.9). In brackets male paratype no. 3522–140. Palp: femur 0.60, patella 0.18, tibia 0.50, tarsus 0.20, total 1.48. Procurus 0.8.

Female: Prosoma 1.3 wide, 1.2 long; opisthosoma 1.5 wide, 3.5 long; total body length 4.7. Legs: I, femur 9.0, patella 0.7, tibia 8.2, metatarsus 14.0, tarsus 1.2, total 33.1; II 6.5, 0.7, 8.6, 9.2, 1.2, 23.6; III 5.0, 0.7, 4.5, 6.5, 1.0, 17.7; IV 7.0, 0.7, 5.0, 9.0, 1.2, 22.9. Palp femur 0.40, patella 0.14, tibia 0.19, tarsus 0.3, total 1.03.

Distribution.—This species is endemic to El Hierro, and is only known from the type locality.

Remarks.—*Pholcus bimbache* appears to be related to members of the so-called Tener-

ifensis group (Wunderlich 1987, 1991; Dimitrov & Ribera 2003) composed of ten species (seven in Tenerife and three in Gomera). Here we should note that the term “Tenerifensis group” is used as merely descriptive and does not imply any phylogenetic relationship. All these species are characterized by the claw-shaped apophysis of the appendix, and by the shape of both the uncus and the lamella of the procurus. *Pholcus sveni* Wunderlich 1987 is the most similar species. *Pholcus bimbache* can be distinguished from it by the longer and more curved claw-shaped apophysis, the shape of the procurus and the morphology of both the epigynum and the vulva. The presence of this species on El Hierro Island emphasizes the close faunistic relationships between Tenerife, La Gomera and El Hierro.

Pholcus anachoreta new species

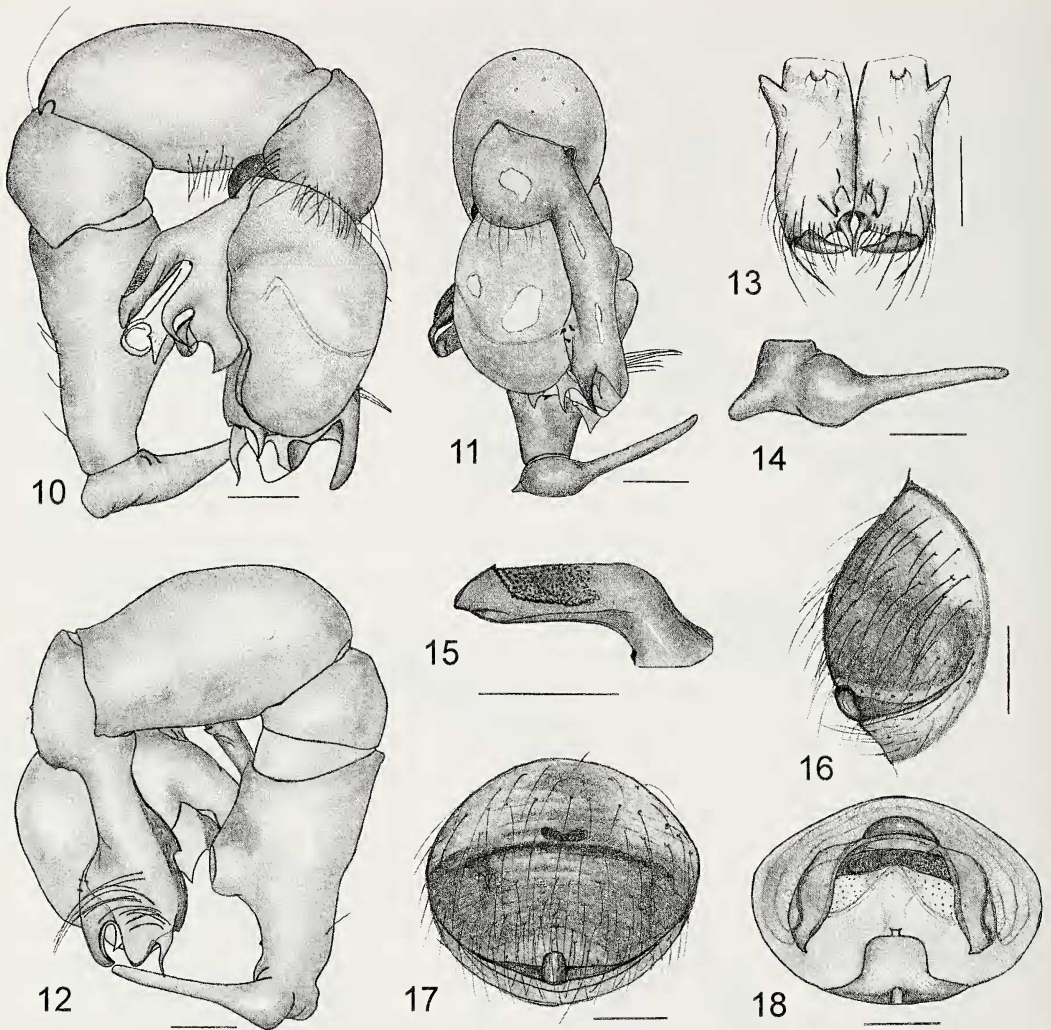
Figs. 10–18

Material examined.—Holotype male, Montaña Clara islet, Canary Islands, 29°18'N, 13°31'W, 24 April 1994, C. Ribera (CCRUB 2459–99). Paratypes: Canary Islands: 1 male, 1 female, same locality, 23–27 November 2002, A.J. Pérez (CCRUB 4502, 4503–170); 1 juvenile, from the same locality, 27 January 2002, P. Oromí (CCRUB 4504–170).

Etymology.—The name comes from the Greek word “anachoretēs” meaning person who lives in a lonely place dedicated to contemplation. This word was adopted in the Latin as anachoreta–ae keeping the male gender. Named after the remoteness and isolation of the type locality.

Diagnosis.—*Pholcus anachoreta* is easily distinguished from canarian congeners by the serrated keel of the uncus (Fig. 15), the morphology of the apex of the procurus (number and shape of the apophyses and lamellas) and the cheliceral apophyses (Fig. 13). The female can be distinguished from the most similar canarian species (*P. fuerteventurensis* and *P. edentatus*) by the lower sclerotized plate of the epigynum (Figs. 16, 17) and the more arched ridges of the valve (Fig. 18).

Description.—*Male (holotype)*: Prosoma whitish without a clearly marked fovea and practically indistinguishable cephalothoracic junction. The prosoma does not carry hairs except for its borders and the intraocular area. Ocular area elevated. Sternum with a whitish coloring. Clypeus high and whitish. Chelic-



Figures 10–18.—*Pholcus anachoreta* new species: 10. Male palp, prolateral view; 11. Male palp, frontal view; 12. Male palp, retrolateral view; 13. Male chelicerae; 14. Trochanter of the male palp; 15. Uncus; 16. Epigynum, lateral view; 17. Epigynum, ventral view; 18. Vulva, dorsal view. Scale bar 0.2 mm.

erae (Fig. 13) whitish; cheliceral apophyses darker with conical shape and group of 2–3 thick bristles placed near the base. The proximolateral apophyses (proximal teeth) and the frontal prominence show the same coloring as the rest of the chelicerae. The upper margin of the proximolateral apophyses is higher than the lower margin of the frontal prominence. Distance between AME less than their diameter. The rest of the eyes situated in two elevated triads. AME around 50% of the size of the other eyes. Anterior eye line frontal view slightly recurved. Posterior eye line dorsal view recurved. Palps as in Figs. 10–12. Tro-

chanter (Fig. 14) with long curved retrolateral apophysis, femur with ventral bulge, procurus very complex with many apical lamellae and with three distal dorsal spines. Uncus (Fig. 15) very characteristic with serrated keel. Opisthosoma elongated and cylindrical with whitish color, dorsally darker. A longitudinal zone with darker pigmentation starting from the genital area and followed by two tear-shaped spots is observed ventrally.

Female (paratype): Prosoma: all characters as in male except for the cheliceral apophyses, which are absent. Sizes and distribution of the eyes as in the male but the elevation of the

ocular area is less conspicuous. Opisthosoma cylindrical with yellowish coloring. The genital zone is darker, with brownish pigmentation. Dorsally with two parallel lines of dark spots. The whole opisthosoma is covered with short and regularly distributed hairs. Epigynum and vulva as in Figs. 16–18.

Measurements.—*Male (type)*: Prosoma 1.2 wide, 1.0 long; opisthosoma 1.0 wide, 3.1 long; total body length 4.1. Legs: I, femur 9.5, patella 0.4, tibia 12.0, metatarsus 16.0, tarsus 2.0, total 39.9; II 6.2, 0.4, 6.0, 10.0, 1.0, 23.6; III 5.0, 0.4, 4.2, 7.0, 1.0, 17.6; IV 7.0, 0.4, 6.0, 6.5, 0.8, 20.7. Palp femur 0.8, patella 0.2, tibia 0.7, tarsus 0.3, total 2.0. Procrurus 0.75

Female: Prosoma 1.9 wide, 1.5 long; opisthosoma 1.8 wide, 4.0 long; total body length 5.5. Legs: I, femur 8.3, patella 0.5, tibia 8.0, metatarsus 12.9, tarsus 1.9, total 31.6; II 6.4, 0.5, 5.6, 9.6, 1.5, 23.6; III 4.9, 0.5, 4.9, 7.3, 0.9, 18.5; IV 6.8, 0.5, 5.6, 8.8, 1.7, 23.4. Palp femur 0.34, patella 0.10, tibia 0.24, tarsus 0.24, total 0.92.

Distribution.—This species appears to be endemic to Montaña Clara and is known only from type locality, although it might occur in the neighboring islets of Graciosa and Alegranza and in Lanzarote island considering their geographical vicinity.

Remarks.—The structure of the procrurus of this species is similar to that of *P. edentatus* Campos & Wunderlich 1995 and *P. fuerteventurensis* Wunderlich 1992. Similar finger-like lamellae in the procrurus allow the three species to be distinguished from the rest of the Canarian *Pholcus*. Despite of this remarkable similarity the procrurus and the unculus are very different and therefore very useful for specific identification.

Pholcus corniger new species

Figs. 19–32

Material examined.—Holotype male, Cueva de San Miguel, San Miguel de Abona, Tenerife, Canary Islands, 28°06'N, 16°36'W, 1 January 1991, P. Oromi (CCRUB 4500–170). Paratype: Canary Islands: 1 female from the same locality, 1 January 1991, P. Oromi (CCRUB 4501–170).

Etymology.—The specific name refers to the shape of the elevated ocular area reminding horns. The word “corniger” in Latin means “with horns”.

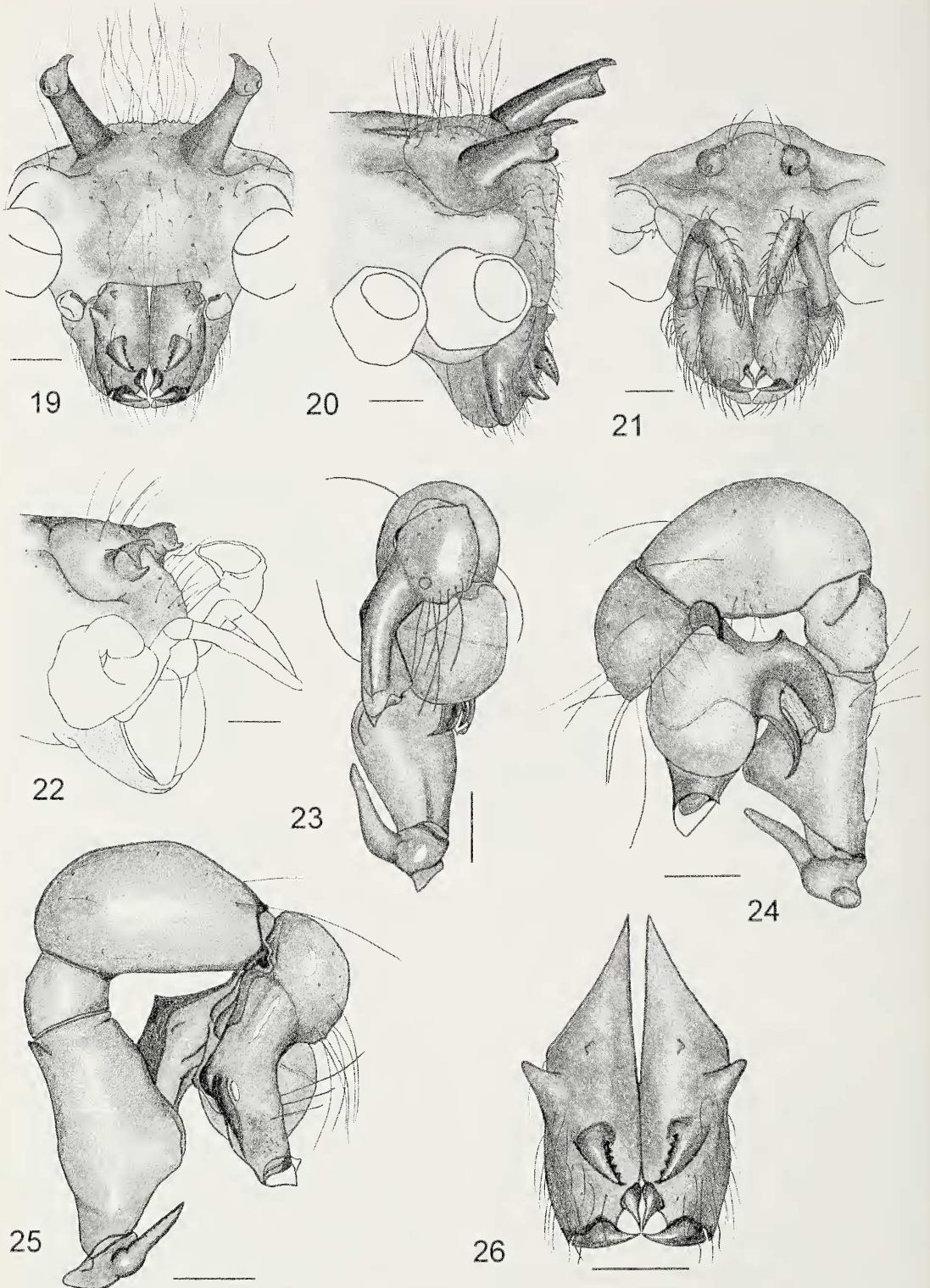
Diagnosis.—*Pholcus corniger* can be easily

distinguished from the rest of canarian *Pholcus* species by the simplified structure of the procrurus with single membranous lamella on its apex, the presence of six teeth and the absence of basal bristles on the cheliceral apophyses (Fig. 26). The female is differentiated by the elevated conically shaped epigynum (Figs. 27–29). This species can be easily distinguished by the total reduction of the eyes (both in male and female) and the shape of the elevated ocular area that reminds horns (Figs. 19–22).

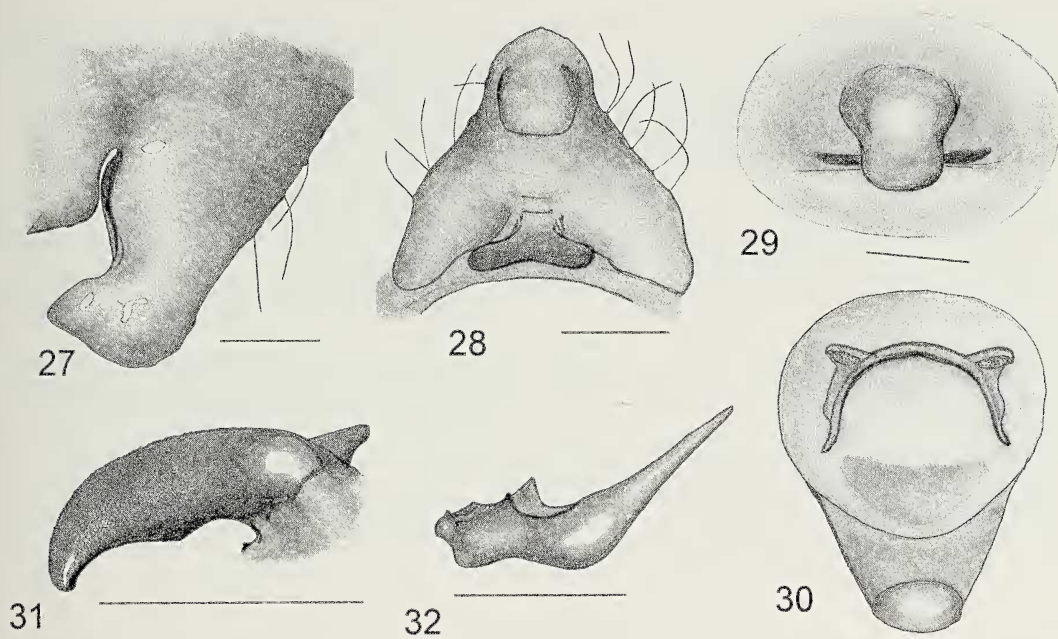
Description.—*Male (holotype)*: Prosoma with an ochre-yellow coloring and well-marked fovea and cephalic furrow. Eye area elevated with characteristic shape and brown coloring (Figs. 19–20), with group of hairs between the ocular elevations. Clypeus high, yellowish with brownish spot in the center and almost transparent at the edges. Sternum yellowish. Chelicerae yellow-brownish, with brown apophyses carrying six dark brown teeth without bristles at the base (Fig. 26). Frontal prominence small. The upper margin of the proximolateral apophyses roughly reaching the lower margin of the frontal prominence. Eyes completely missing. Palps as in Figs. 23–25. Unculus as in Fig. 31. Trochanter (Fig. 32) with retrolateral apophysis, femur with ventral bulge. The procrurus is very characteristic, conspicuously different from those of the remaining species of Canarian *Pholcus*. While in all the other species the apical part of the procrurus is very complex and carries one or various apophyses and lamellar processes, in *P. corniger* it is much simpler and ends with a single membranous lamella. This lamella extends along all the apex of the procrurus. Opisthosoma cylindrical with pale yellowish color.

Female (paratype): Like the male, although the elevations of the ocular area are much smaller and colored like the rest of the prosoma (Figs. 21, 22). Prosoma lighter. Clypeus almost transparent. The genital area is not pigmented except for the sclerotized parts of the epigynum. Epigynum and vulva as in Figs. 27–30. As in the male, eyes are absent.

Measurements.—*Male (holotype)*: Prosoma 1.1 wide and 1.0 long; opisthosoma 1.0 wide and 2.5 long. Total body length 3.5. Legs: I, femur 7.0, patella 0.3, tibia 7.0, metatarsus 11.5, tarsus 1.3, total 27.1; II 5.5, 0.3, 5.2, 8.0, 1.2, 20.2; III 4.0, 0.3, 3.9, 5.3, 1.0,



Figures 19–26.—*Pholcus corniger* new species: 19. Male prosoma, frontal view; 20. Male prosoma, lateral view; 21. Female prosoma, frontal view; 22. Female prosoma, lateral view; 23. Male palp, frontal view; 24. Male palp, prolateral view; 25. Male palp, retrolateral view; 26. Male chelicerae. Scale bar 0.2 mm.



Figures 27–32.—*Pholcus corniger* new species: 27. Epigynum, lateral view; 28. Epigynum, caudal view; 29. Epigynum, ventral view; 30. Vulva, dorsal view; 31. Uncus; 32. Trochanter of the male palp. Scale bar 0.2 mm.

14.5; IV 6.5, 0.3, 5.0, 7.0, 1.0, 19.8. Palp femur 0.50, patella 0.10, tibia 0.50, tarsus 0.28, total 1.38. Procrurus 0.4

Female: Prosoma 1.1 wide, 1.0 long; opisthosoma 1.1 wide, 2.2 long; total body length 3.2. Legs: I, femur 7.0, patella 0.3, tibia 6.5, metatarsus 11.0, tarsus 1.8, total 26.6; II 6.2, 0.3, 5.0, 7.2, 1.1, 19.8; III 4.0, 0.3, 3.8, 5.0, 0.8, 13.9; IV 6.0, 0.3, 5.0, 7.0, 1.0, 19.3. Palp femur 0.24, patella 0.07, tibia 0.19, tarsus 0.30, total 0.80.

Distribution.—Endemic to the island of Tenerife, only known from the type locality.

Remarks.—Determining the closest relatives is difficult for this species. Taking into account the shape of the uncus, this species can be associated to the Tenerifensis group (see above). On the other hand, though, the epigynum of the female is very different from those of the Tenerifensis group, and it looks more similar to that of *P. baldiosensis* Wunderlich 1992 (the other troglomorphic species). Unfortunately, we cannot determine whether the male of *P. baldiosensis* is in fact similar to the Tenerifensis group since it still remains unknown.

Taking in account the characteristic features of the epigynum and the procrurus, which are

remarkably different from those of the other Canarian *Pholcus* species, *P. corniger* could possibly be a member of a different group, or it could form a subgroup (with *P. baldiosensis*) of the Tenerifensis group. In order to yield an answer to this question, a detailed phylogenetic study must be performed.

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